THE AMENDMENTS

In the Claims:

1. (Previously Presented) A proteorhodopsin mutant having improved optical characteristics, said mutant is a proteorhodopsin variant comprising a mutation in a conserved histidine residue, said proteorhodopsin variant having at least 90% identity with its corresponding naturally occurring proteorhodopsin, said conserved histidine is present at the position equivalent to position 75 of SEQ ID NO: 3 when the proteorhodopsin variant is aligned with SEQ ID NO: 3 for maximum identity, wherein said proteorhodopsin mutant has lower pK_{rh} in comparison with the proteorhodopsin variant.

2-3. (Cancelled)

4. (Previously Presented) The proteorhodopsin mutant according to Claim 1, wherein said naturally occurring proteorhodopsin comprises SEQ ID NO: 1, 3, 27, 103, 121, 125, 133, 139, 151, or 161.

5. (Previously Presented) The proteorhodopsin mutant according to Claim 4, wherein said naturally occurring proteorhodopsin comprises SEQ ID NO: 1 or SEQ ID NO: 3.

6. (Cancelled)

7. (Previously Presented) The proteorhodopsin mutant according to Claim 1, wherein said conserved histidine residue is mutated to an amino acid capable of forming a hydrogen bond.

8. (Original) The proteorhodopsin mutant according to Claim 7, wherein said amino acid capable of forming a H-bond is asparagine, glutamine, lysine, arginine, tryptophan, serine, threonine, tyrosine, aspartic acid, or glutamic acid.

9. (Original) The proteorhodopsin mutant according to Claim 8, wherein said amino acid

capable of forming an H-bond is asparagine, glutamine, lysine, tryptophan, aspartic acid, or glutamic acid.

10-13. (Cancelled)

14. (Previously Presented) The proteorhodopsin mutant according to Claim 1, comprising the amino acid sequence of SEQ ID NO: 165.

15. (Cancelled)

16. (Currently Amended) A method for preparing the proteorhodopsin mutant having improved optical characteristics according to Claim 1, comprising the steps of:

(a) identifying the conserved histidine amino acid residue of ~~the naturally occurring proteorhodopsin or~~ the proteorhodopsin variant of claim 1,

(b) mutagenizing the conserved histidine amino acid residue, and obtaining proteorhodopsin mutants,

(c) determining the optical characteristics of the proteorhodopsin mutants, and

(d) selecting the proteorhodopsin ~~variant~~ mutant having improved optical characteristics.

17-18. (Cancelled)

19. (Previously Presented) The method according to Claim 16, wherein said conserved amino acid residue is mutagenized by site-directed mutagenesis.

20-22. (Cancelled)

23. (Previously Presented) The proteorhodopsin mutant according to Claim 1, wherein the proteorhodopsin variant has at least 97% identity with the naturally occurring proteorhodopsin.

24. (Cancelled)

25. (Previously Presented) A proteorhodopsin mutant having improved optical characteristics, said mutant is a proteorhodopsin variant comprising a mutation in a conserved histidine residue, said proteorhodopsin variant is selected from the group consisting of SEQ ID NO: 1, 3, 27, 103, 121, 125, 133, 139, 151, and 161, or having at least 90% identity with the naturally occurring proteorhodopsin, said conserved histidine is present at the position equivalent to position 75 of SEQ ID NO: 3 when the proteorhodopsin variant is aligned with SEQ ID NO: 3 for maximum identity, wherein said proteorhodopsin mutant has lower pK_{rh} in comparison with the proteorhodopsin variant.

26. (Previously Presented) The proteorhodopsin mutant according to Claim 25, wherein the proteorhodopsin variant has at least 97% identity with the naturally occurring proteorhodopsin .

27. (Previously Presented) The proteorhodopsin mutant according to Claim 25, wherein the naturally occurring proteorhodopsin comprises the amino acid sequence of SEQ ID NO: 3.